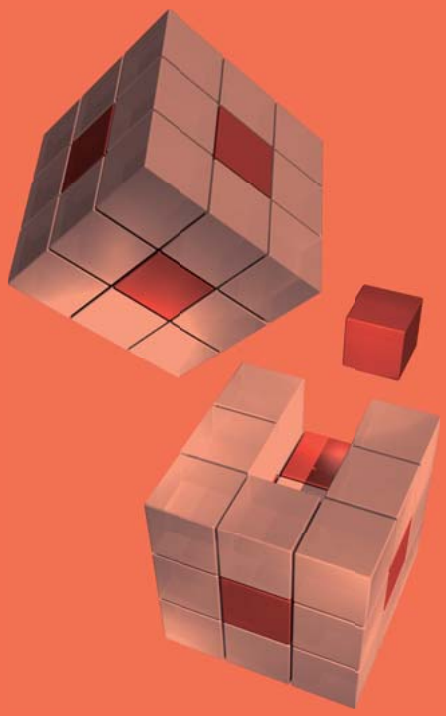

Home & Office Electronics

Consumer Appliances

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Image and Information Equipment

Home Photovoltaic Generation System Incorporating New High-efficiency Power Conditioner

The expectations for renewable energy are growing against a background that includes concern for the environment, growing awareness of energy efficiency and power saving, and a tight electric power supply situation. With the aim of expanding its business in this field, Hitachi Appliances, Inc. has drawn on its many years of experience with inverters to develop a photovoltaic power generation system for home use. In this article, staff involved in setting up all aspects of this business, right back to the manufacturing stage, describe the features of this Hitachi-branded home photovoltaic generation system together with their plans for the future.

Product Development Based on Superior Technology

The highly efficient inverter technology that Hitachi has built up over many years is already widely used in home appliances. The project to utilize this superior technology to develop a power conditioner and commercialize a home photovoltaic generation system under the Hitachi brand commenced approximately three years ago. The home photovoltaic generation system includes photovoltaic cell modules, a frame for supporting the modules, and a connection box, and the power conditioner has the important role of converting the direct current (DC) power produced by the photovoltaic cell modules into alternating current (AC) power in a form that can be used in the home. Accordingly, our aim was to produce a distinctive system by drawing together technical capabilities from across Hitachi to create a power conditioner with unique characteristics.

Also, because this would be the first home photovoltaic generation system ever launched under the Hitachi brand, our work extended beyond the manufacturing of the hardware to encompass business development and the creation of a sales infrastructure both inside and outside the company, including the establishment of our own training and qualification scheme for sales and installation.

Using Skills in Control Engineering to Maximize Generation by Monitoring Sun's Rays

In developing the system, we wanted to increase the total amount of electric power it generated. The power conditioner would play a key role in achieving this. We started by selecting power semiconductors with low losses and incorporated proprietary inverter control technologies to achieve a 96% power conversion efficiency, which is the top class in the industry*. We then directed our efforts towards maximizing the amount of electric power that we could extract from the photovoltaic modules by developing a new control algorithm that adapted to changes in solar intensity.

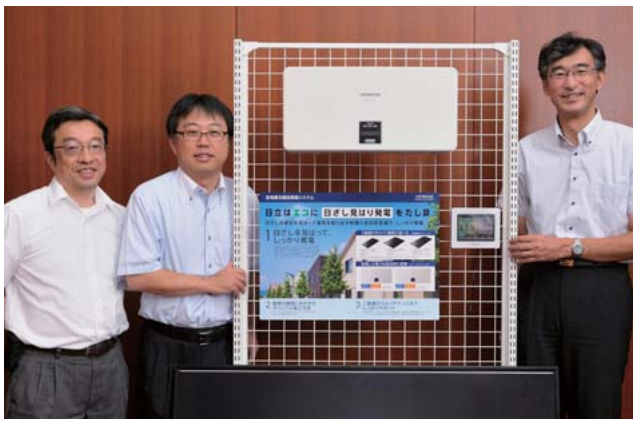
Typically, after the weather, the next largest factor in determining energy losses in photovoltaic power generation is shade. In response, we developed the Hitachi maximum power point tracking control technology that increases the amount of power produced by instantaneously finding the peak in power output at appropriate timings, including when partial shading occurs during the day. In other words, it monitors the sun's rays to maximize power generation.

Also, home roofs come in many different shapes and sizes. To ensure that large amounts of power can be generated efficiently, we provided photovoltaic cell modules in three different sizes from which customers can choose the one that best fits their roof. In addition to considering how the system will appear after it is installed and providing ease of installation by developing our own unique installation method, which includes specially designed module cramps and a unique frame with horizontal rails that we designed in-house, we also conducted training for the specialist staff who would perform the installations.

Developing Even More Attractive Photovoltaic Power Generation Systems

Because the home photovoltaic generation system is a system product that includes installation, we also established the infrastructure to ensure that customers could be satisfied with this Hitachi-branded product with confidence, including comprehensive support that extends from quotation through to installation and maintenance. Our aim for the future is to continue developing photovoltaic power generation systems that will prove attractive to large numbers of customers by making further improvements to the efficiency of the power conditioner, and also by developing new cramps and expanding the range of certified frames so that the system can be installed on a greater variety of roof types.

* Based on a comparison of the HSS-P40A and HSS-P55A models released on August 20, 2012 with other power conditioners for home photovoltaic power generation systems available in Japan. Rated load efficiency as defined in JIS C 8961.



Takashi Tomita (left), Senior Manager, Design Department IV, Taga Home Appliance Works, Home Appliance Group; Satoru Usui (middle), Manager, New Energy System Planning Department, Eco System Division, Eco Appliances Business Group, Hitachi Appliances, Inc.; Akihiko Kanouda (right), Assistant to General Manager, Information and Control Systems Research Center, Hitachi Research Laboratory, Hitachi, Ltd.

Refrigerator Featuring Vacuum Compartment to Protect Nutrients in Food

Hitachi has released a series of refrigerators featuring "vacuum*1 compartment," including the new R-C6800, which feature a "photocatalyst preservation" function that uses a photocatalyst to keep meat, fish, and fresh vegetables as if they "sleep" in a vacuum compartment unique to Hitachi in which the vacuum also inhibits oxidation and helps keep food fresh.

The main features are as follows:

(1) The R-C6800 includes a photocatalyst preservation function that uses a photocatalyst and the operation of a light-emitting diode (LED) to store meat, fish, and fresh vegetables as if they "sleep." In this state, processes such as the respiration of vegetables and the functions of enzymes on the surface of meat or fish are suppressed. This is done by carbon-dioxide rich environment owing to photocatalytic effects in the vacuum compartment. As well as being superior to previous methods of minimizing the loss of freshness in meat or fish and the loss of nutritional value in vegetables, the technology also helps reduce odors.

(2) "Frost recycle cooling," which utilizes cold air from frost that builds up on the evaporator, has been continuously used. The new models also incorporate a new cooling technology for the refrigerator compartment. Two temperature sensors and two electric dampers are used in the technology to supply appropriately the cold air within the compartment. This has allowed the development of new energy efficiency technologies that also prevent over-cooling.

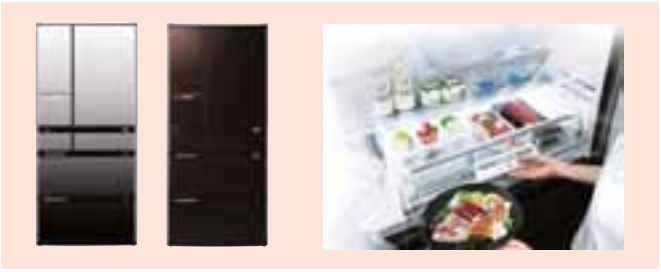
(3) At 670 L, the R-C6800 has the largest capacity of any domestic refrigerator in Japan*2. To boost its strength, glass-fiber-reinforced plastic has been used for the first time in the case for large objects in the third compartment of the lower freezer area and in the lower case in the vegetable compartment. This has permitted the removal of reinforcements from the bottom of the cases and enlarged the volume available for food storage.

(4) The new R-C6800 features a newly designed crystal mirror doors that enhance kitchen appearance. The use of a mirror with deep coloring as a door material conveys a sense of superior interior design that combines a high-quality appearance with simplicity.

(Hitachi Appliances, Inc.)

*1 Indicate a state when atmospheric pressure is low with the vacuum compartment deemed to be in a "vacuum" when it is at approximately 0.8 atmospheric pressure.

*2 As of November 2012. Domestic, fluorocarbon-free fridge-freezers available on the Japanese market



R-C6800 (X) (left) and R-C6800 (XT) (right) refrigerators featuring vacuum compartment to protect nutrients in food

Big-drum Washer-dryers and Big-drum Slim Washer-dryers Featuring Heat Recycling and Wind Iron

Hitachi has released a big-drum washer-dryer featuring heat recycling and wind iron, a large drum washer-dryer with features that include a drain hose designed to minimize dirt build up, and also the auto self clean function that flushes out the dirt behind the drum and can remove bacteria*1 and black mold*2. Coinciding with this, Hitachi has also released a big-drum slim washer-dryer featuring heat recycling and wind iron, which has a width of only 60 cm.

The main features are as follows:

(1) The auto self clean function flushes out dirt from even out-of-sight locations by rotating the drum at high speed and spraying water from 16 different points, and avoid growth of bacteria and black mold. The machine also uses a hose with a flat internal surface to prevent residual waste water or dirt.

(2) The wind iron function blows air at high speed to remove wrinkles from clothes.

(3) The heat recycling dryer function recovers heat generated during operation and reuses it to produce hot air during drying. Also, energy and water efficiency are improved by enhancements to the unique sensor system that can even detect the ease with which detergent can be rinsed out*3.

(Hitachi Appliances, Inc.)

Big-drum washer-dryer (left) and big-drum slim washer dryer (right) featuring heat recycling and wind iron

*1 Test agency: Kitasato Research Center for Environmental Science, test method: measurement based on reduction in bacteria count on bacteria-infected plate attached to outer tub and drum, tested operation: the auto self clean function, tested parts: outer tub and drum, result: 99% reduction in bacteria count

*2 Test agency: Kitasato Research Center for Environmental Science, test method: confirm suppression of mold growth on culture plates attached to outer tub and drum, tested operation: the auto self clean function, tested parts: outer tub and drum, result: 99% reduction in mold

*3 Varies depending on detergent composition and quantity.

Two-stage Boost Cyclonic Cleaner

Hitachi has released new models in its two-stage boost cyclonic cleaner series. The new cyclonic cleaners use "carbon-fiber-reinforced plastic" and "easy-to-use hose" to reduce the weight of the head and pipe as well as the hose.

The main features are as follows:

Two-stage boost cyclonic cleaner

(1) Ease-of-use improved through use of a lightweight head and pipe made from carbon-fiber-reinforced plastic and a hose that uses a mix of flexible and rigid plastics to provide both flexibility and ease of sliding (easy-to-use hose). Compared to previous models, the head and pipe are approximately 13%*1 lighter and the hose is approximately 17%*2 lighter due to the inner diameter being reduced by 10 mm to 36 mm.
(2) The design has been optimized for quiet operation, reducing the level of noise from sources such as the fan motor blades, vibration, or wind noise in the cyclone chamber. This has succeeded in reducing the noise level during use to only 53 dB, while still delivering a powerful 470 W of suction power.
(3) A clean exhaust design that combines an extremely airtight motor case for housing the fan motor and a filter with a high level of dust collection performance delivers clean exhaust air with a dust capture ratio of 99.999%*3.
(Hitachi Appliances, Inc.)

*1 Comparison between total weight of extension pipe and head of new model (820 g approximately) and old 2010 model (940 g approximately).
*2 Comparison between hose weight of new model (345 g approximately) and old 2010 model (415 g approximately).
*3 Result of third-party testing by German test agency SLG Prüf-und Zertifizierungs GmbH in accordance with International Electrotechnical Commission (IEC) standard IEC 60312-1:2010(ed.1). The dust capture ratio (mean) for particle diameters between 0.3 and 10 µm was 99.999%

Stainless/Clean Room Air Conditioner

Hitachi has released a series of stainless/clean room air conditioners that incorporate a "kurashi" (life scene in Japanese) camera with image recognition technology that can quickly assess the circumstances in the room and the people in it to maintain energy-efficient operation without compromising comfort levels.

The main features are as follows:
(1) Pressing the "kurashi camera: eco korekkiri" ("one button for all" in Japanese) button on the remote control instructs the air conditioner to quickly assess information, not only on people's entry and exit, where they are in the room, their level of activity, and how many there are, but also on factors such as room layout and areas exposed to sunlight. The air conditioner then operates in accordance with actual conditions in a power-saving mode that takes account of both energy efficiency and comfort.
(2) Internal air ducts and louver (lower side) are equipped with stainless steel to minimize bacteria and dust accumulation.
(3) Heating features include a "quick heating" function that starts blowing warm air within a minute after the press of the start button, by pre-setting the time to start the air conditioner (such as the time when people get up in the morning). In addition, an "advance warm air" function that prevents the room temperature from falling when operating in defrosting mode.
(Hitachi Appliances, Inc.)

Stainless/clean room air conditioner

5000 lm WUXGA Projector CP-WU8450

Hitachi has released a high-brightness (5000 lm) and high-resolution wide ultra extended graphics array (WUXGA) (1,920×1,200 dots) projector. This projector is the representative model of a new Hitachi installation series.

This projector provides ease of installation and ideal functionality for large venue applications.

The projector offers several groundbreaking features, including two high definition multimedia interface (HDMI) inputs, which address the increasing demand for digital connectivity. The projector also features motorized focus, zoom and lens shift, enabling easy adjustment of the image. Moreover, the projector features 360-degree vertical adjustment capability, which is ideal for creative applications.
(Hitachi Maxell, Ltd.)

5000 lm WUXGA projector CP-WU8450

Short Throw Projector CP-D32WN

This projector can display a projected image on an 80-inch screen at a throw distance of only 71 cm. Because it is located directly in front of the screen, the projector and its exhaust air do not obstruct the presentation.

This projector features Saver mode that reduces lamp power by 70% compared to normal operation to provide considerable energy savings. Saver mode activates to reduce lamp brightness and therefore power consumption if the projected image does not change within a set time.
(Hitachi Maxell, Ltd.)

Short throw projector CP-D32WN